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The Critical Path

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A Newsletter Published for Code 400 Employees

In This Issue

Making Hubble Even Better

In the early hours of Tuesday, February 11, night turned into day over Kennedy Space Center as Discovery and its seven astronauts soared skyward on a mission to service the Hubble Space Telescope.

At 3:55 a.m. Eastern time, the very opening of the first available launch window, Commander Ken Bowersox, Pilot Scott Horowitz, and Mission Specialists Mark Lee, Steve Smith, Joe Tanner, Greg Harbaugh and Steve Hawley roared from Launch Pad 39-A in an awesome display of light and sound to begin the second planned mission to upgrade and service the bus-sized, Earth-orbiting telescope.

Rendezvous with an Old Friend

As Discovery closed in on Hubble, the seven astronauts spent their first full work day checking out the Shuttle's robot arm and preparing for the four planned spacewalks. Controllers at Goddard Space Flight Center shut Hubble's aperture door, secured its antennas and awaited the Shuttle rendezvous.

Early on the morning of February 13, Commander Ken Bowersox,

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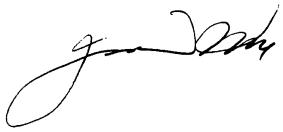
A MESSAGE FROM THE DIRECTOR OF

As Acting Director of Code 400, I'd like to take this moment to briefly mention two matters. The first is to say Hail and Farewell to the 13 of you who have decided to accept a buyout offer and to move on to new challenges (see page 11 for list). And especially, of course, to say good-bye to Vern Weyers, who I have served as Deputy for these past four years.

Secondly, I'd like to offer my congratulations to the HST group (Codes 440, 441 and 442) and those that support them for their stunning achievement in the highly successful Second Servicing Mission. It was an incredible team effort from all those involved. Let us now proceed apace with all our other work and the upcoming series of launches later this year.



Jim Moore, Acting Director

A New Day — With GOES-K

GOES-K, scheduled for launch April 24, 1997, will represent another cooperative effort between NASA and NOAA. The difference between this mission and others is that GOES-K will be placed in on-orbit storage. This will increase the GOES program's ability to reduce or eliminate downtime in weather observations of the East and West coasts. On-orbit storage is not a new concept, however, GOES-K is the first 3 axis stabilized spacecraft to be stored, on-orbit, spinning. During the 1980's on-orbit storage was discontinued due to cost effectiveness concerns. This spinning technique will preserve the life limited components of the spacecraft, such as the momentum wheels.

On-orbit storage provides an opportunity to place GOES-K into active duty quickly. Stored at 105 degrees west longitude, directly in the middle of both coasts, GOES-K can be moved, tested, and activated within 45 days. Should a failure occur with either of the currently operating GOES spacecraft, GOES-K will be ready to go.

Many of the procedures performed by the Flight Operations Team have been automated and are ready for use with this mission. Labor intensity and cost for maintaining on-orbit storage are significantly reduced by use of these new methods.

GOES-K will greatly enhance human safety and reduce the risk of economic losses by improving early awareness of severe weather conditions such as hurricanes. This technology coupled with the improved cost efficiencies associated with operations make this mission a particularly valuable one for NASA and NOAA. Best wishes to the GOES-K team for a safe launch and successful mission!

Michele D. Marrie, Code 415
Project Financial Manager

Critical Path Social News

The social highlight of the past quarter was the affair held for Code 400's own Vern Weyers, on the occasion of his retirement. The words of praise directed to Vern for both his excellence as an individual as well as for his technical contributions to the Center were truly genuine. A large number of distinguished speakers said a few words each and presented Vern with a variety of Goddard mementos. Speakers included current and former Center Directors Joe Rothenberg and John Klineberg, Deputy Center Director Al Diaz, Acting NASA Deputy Administrator General John Dailey, and a score of directorate leaders and project managers. A constant thread of key words surfaced time and again: 'gentleman', 'leader', 'interested in people as well as technical excellence', and on. Vern spoke briefly, giving his thanks to all Goddard employees, and paying special tribute to his wife, Maureen. The staff of The Critical Path wishes to add its best wishes to Vern and his family on all their future endeavors.

PERSONALITY TINTYPES

Mary J. Halverstadt

In 1991, Mary joined the GSFC Resident Office at Kennedy Space Center (KSC). Mary is the MDA Resident Office (RO) Supervisor and is responsible for insuring proper clearance and training for the GSFC NASA/Contractors processing payloads at KSC.

BORN: In Ashland, Kansas, a small town about 30 miles south of Dodge City, Kansas. (She has never seen a gunfight.)

EDUCATION: Attended Southwestern, at Winfield, Kansas resulting in a Teaching Certificate.

ON FAMILY: Mary lives on Merritt Island, FL, with her husband, Ronald. Their four children no longer are at home. Two live locally and two out of state. There are three grandchildren which are the love of Mary's life. Also, she is in the process of adopting several thousand regular payload team members from GSFC.

LIFE BEFORE GSFC RESIDENCE OFFICE: Mary has been in the Aerospace business for several years. She was involved with scheduling shuttle (STS) modifications and processing flows through the various KSC facilities. Also, she has helped develop classified schedules/ documents for both shuttle (STS) and the IUS programs and was custodian for these secure documents.

LIFE AT GSFC RESIDENCE OFFICE: She finds being the MDA RO Supervisor hectic, challenging, rewarding and loves every minute of it. Payload processing has given her the opportunity to meet many wonderful people from different GSFC organizations and to interface with many organizations at KSC involved with badging, security and training.

HOBBIES: Mary and her husband are avid Garden Railroad enthusiasts. They belong to many railroad clubs (HO and G Scale) throughout Florida which keeps the Halverstadt's busy with railroad activities. Mary makes individualized "Train Flags" for enthusiasts and in her spare time she loves to garage sale and enjoys antiquing. Come see their garden train layout which surrounds their home.

Orlando Figueroa

Orlando joined the Explorer Project in November, 1995 as the Project Manager. Prior to this, he was the Small Explorer (SMEX) Project Manager.

BORN: In San Juan, Puerto Rico.

EDUCATION: BS degree in Mechanical Engineering from the University of Puerto Rico, Mayaguez campus, and several credits in advanced graduate studies from the University of Maryland

ON FAMILY: Orlando and his wife Josephine, also from Puerto Rico live in Silver Spring Maryland with their two teenage sons; Daniel (16) and Alexis (14). Josephine is an accounting clerk with the National Restaurant Organization in Washington. DC.

LIFE ON EXPLORER: Orlando finds his current position quite exciting and challenging. The recent restructuring of the Explorer Program to provide more frequent opportunities for investigations and the broader range of mission implementation modes have brought about the need for a new way of doing business. It is expected that the program will be launching one MIDEX, one SMEX, and one or two UNEX class investigations by 2000 while developing leading edge technologies to enable high capability missions at lower cost.

LIFE BEFORE EXPLORER: Since joining GSFC in 1978, Orlando has been involved in several missions. They include: the Heat Capacity Mapping Mission, Balloon Borne Helium-3 Cryostats, Cosmic Background Explorer, Broad Band X Ray Telescope, Head of the Cryogenics Technology Section, Project Manager for the Superfluid Helium On-Orbit Transfer Mission, and Project Manager for the Small Explorer Project.

HOBBIES: Running, reading, hiking, softball, listening to music (especially Latin jazz), dancing and attending his two sons' football, basketball, and lacrosse games.

EDITOR'S NOTE: GOOD LUCK TO ORLANDO ON HIS TRANSFER TO STAAC

FEEDBACK

GSFC Resident Office at KSC

Suddenly 1997 has arrived and has promised us a busy schedule for our GSFC payloads. HST-SM-02 payload teams have been processing at KSC since October and everyone has looked forward to the successful launch aboard STS-82 on February 11. Geostationary Operational Environmental Satellite-K (GOES-K), which is an advanced weather satellite, arrived on a C5A at the Shuttle Landing Facility in January. Payload processing is being accomplished at the Astrotech plant in nearby Titusville with a planned launch date of April 24. STS-83 is scheduled for launch on March 27 with GSFC payload CRYO-FD on board. Small payloads (TAS-01, IEH, and SEM-02) will be launched July 15 on STS-85. These small payloads are being processed in the new Space Station Payload Facility (SSPF).

New methods for processing foreign national team members are being discussed. These new procedures are projected to begin sometime this year with GSFC processing foreign nationals for the center and also for the resident offices. This procedure will include the GSFC Resident Office at Kennedy Space Center, FL. (KSC)

Former Shuttle astronaut and retired U.S. Air Force Major General Roy D. Bridges, Jr. has been selected to be the Director of KSC. Other KSC changes that have transpired include the retirement of John Conway, Director of Payload Operations, who has been replaced by Bobby Bruckner. Bobby's replacement as Director, Payload Ground Operations is Sterling Smith, acting. Shannon Bartell replaced Thomas Breakfield as Director, Payload Flight Operations.

The APOLLO/SATURN V Center has been officially opened to the public. Tours are conducted from the Spaceport at KSC. This is a new facility north of the Vehicle Assembly Building (VAB) which now houses the refurbished Apollo Booster and other memorabilia.

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who piloted the first Hubble servicing mission in December 1993, manually guided Discovery to within 35 feet of the telescope. From this distance, astronaut Steve Hawley, who first deployed Hubble in 1990, used Discovery's robot arm to gently pluck the waiting telescope from its orbit and bring it safely to the shuttle's payload bay.

"You should have seen the expression on Dr. Stevie's face," said Commander Ken Bowersox. "It looked like he just shook hands with an old friend."

The first spacewalk began on February 13 at 11:34 p.m. Eastern time with a bit of unplanned excitement: One of Hubble's solar arrays unexpectedly swung from a horizontal to vertical position then halfway back to horizontal, "waving" to the crew and ground controllers as Lee and Smith were about to exit the Shuttle.

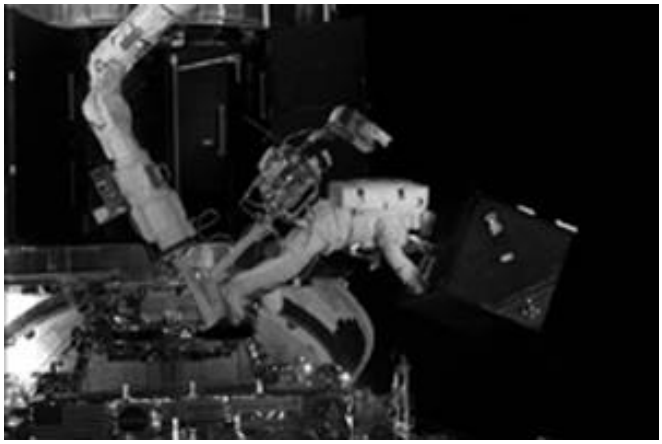
Controllers determined that a gust of air from the depressurizing airlock spun the array, but did not damage it. They repositioned the array and, after 2 hours in the cramped airlock, Lee and Smith finally left the Orbiter to meet Hubble face-to-face.

"Oh my gosh! Beautiful!" Lee exclaimed as he admired the 43-foot tall Hubble. Smith added that it was "worth the wait."

Installing a New View

Lee and Smith gave astronomers and the rest of the world a wonderful Valentine's Day present by installing two new instruments that will see infrared light, dramatically increasing Hubble's science capabilities.

The Space Telescope Imaging Spectrograph (STIS) will separate ultraviolet, visible, and near infrared light to measure the composition, temperature, motion, and other physical properties of celestial objects. STIS will provide fine details of planets, galaxies and nebulae, and it will allow faster hunting for black holes.



The Near Infrared Camera and Multi-Object Spectrometer (NICMOS) will provide finely detailed images and wide views of very distant objects. Because NICMOS sees in the longer, redder wavelengths of the near infrared, it will peer farther into the universe and further back in time than previous Hubble instruments. NICMOS will also see through the obscuring dust shrouding stellar nurseries to help us learn how stars and planets are born.

These powerful, new, telephone booth-sized instruments replaced the Goddard High Resolution Spectrograph and the Faint Object Spectrograph, which were carefully stowed for return to NASA.

Sunburned Skin

Harbaugh and Tanner got their chance to spacewalk the following evening, when they replaced a degraded Fine Guidance Sensor and a failed Engineering and Science Tape Recorder with new equipment. The team also installed an Optical Control Electronics Enhancement Kit, which will increase the capabilities of the new Fine Guidance Sensor.

This spacewalking team, along with ground controllers, got the first look at Hubble's sunburned skin. The astronauts unexpectedly found cracked and peeling thermal insulation on the part of the telescope constantly exposed to the Sun.

At the end of the night's work, Commander Ken Bowersox and Pilot Scott Horowitz gently raised Hubble's altitude by about 1.8 nautical miles by firing Discovery's small maneuvering jets. After orbital debris was detected in the neighborhood, the crew conducted a second burn to raise Hubble and Discovery another half mile, safely out of harm's way.

An Arts-and-Crafts Project

As the crew slept, NASA managers and the Hubble team evaluated ways to repair Hubble's damaged insulation on the upcoming spacewalks. "We have what we call an arts-and-crafts project," joked Russ Werneth, EVA and Crew Systems Manager for Hubble. In scenes reminiscent of Apollo 13,

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tiger teams at JSC and Goddard worked with their "art supplies," swatches of silver and gold insulation, tape, tie wraps and parachute cord, along with other materials the astronauts had available to them aboard Discovery.

On the third spacewalk, Lee and Smith removed and replaced a Data Interface Unit that provides command and data interfaces between Hubble's data management system and other subsystems. The team also replaced an old reel-to-reel Engineering and Science Tape Recorder with a new, digital Solid State Recorder that can store about ten times as much data and allow simultaneous recording and playback.

Finally, the pair changed out one of four Reaction Wheel Assembly units that point Hubble toward its targets and hold it steady as it observes. At the end of the work shift, Discovery's small jets fired again to raise Hubble's altitude for the third time in 2 days.

As the crew settled in to sleep, mission managers decided to add a fifth spacewalk to repair the cracks and peels in Hubble's thermal skin. Hubble managers were concerned that the separated insulation could trap light and cause localized heating, which could damage Hubble's sensitive equipment.

I Love Tools

Harbaugh and Tanner began the mission's fourth spacewalk at 10:45 p.m. Eastern time on Sunday, February 16. First, they replaced the Solar Array Drive Electronics package used to control the positioning of Hubble's solar arrays.

"Boy, I'm glad I'm not too afraid of heights!" Tanner joked as he and Harbaugh then rode the 50-foot robot arm to the top of the telescope. There they replaced covers on Hubble's magnetometers, which use the Earth's magnetic field to sense the telescope's position. The spacewalking duo

also placed patches of multi-layer insulation over two sun-damaged areas around the light shield, just below the top of the observatory.

Meanwhile, Payload Commander Mark Lee and Pilot Scott Horowitz turned Discovery's middeck into a toolshop as they fashioned additional thermal insulation blankets to be placed on Hubble during the fifth spacewalk. Working with diagrams and directions faxed from the "arts-and-crafts" tiger teams, they created bandages from insulation, parachute cord and tie wraps. As Horowitz displayed his handiwork, a third hand moved into the shot and taped an "I LOVE TOOLS" sign across his chest.

"A Possible Glitch"

On the mission's final spacewalk, the team of Lee and Smith attached thermal insulation blankets to two areas along the top of the Support Systems Module, which houses critical data processing, electronics and scientific instrument telemetry packages. Specifically, these sites are: Bay 8, which contains pointing electronics and a Retrieval Mode Gyro Assembly; and Bay 10, which houses the Science Instrument Control and Data Handling Subsystems.

At the end of this spacewalk, Lee and Smith returned to the airlock while controllers evaluated "a possible glitch" in one of the original Reaction Wheel Assembly units. For a time, it looked as though a sixth spacewalk might be necessary. Then controllers realized that their "glitch" was actually a perfectly working reaction wheel, so unusually steady that it appeared to be in trouble.

All servicing tasks complete, Commander Ken Bowersox and Pilot Scott Horowitz once again fired Discovery's tiny maneuvering jets to lift the shuttle and Hubble another 3 nautical miles. As in the first servicing mission, astronauts completed five spacewalks, but on this mission they shaved 2 hours off the work time.

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HST - IT'S A GO!

Hard Work & Tenacity & Technical Skill & Motivation = HST SM2 SUCCESS: and that is exactly what happened before, during, and since the tremendously successful Second HST Servicing Mission in February 1997.

After more than 3 years of planning, training, and preparation, the payload for the Second Hubble Servicing Mission was aboard STS-82 (Discovery) and ready to go. At the Mission Management Team (MMT) L minus 2 Day Review at KSC's O&C Building on Sunday, February 9, the Launch Poll was a GO! This despite a few qualifiers for what turned out to be some not so unusual last minute glitches.

Down at Spaceport USA, Goddard's invited visitors were reviewing their newly acquired packages for a round of briefings (Center Director, Joe Rothenberg and HST Associate Director of Flight Projects for HST, John Campbell), tours of KSC, and, of course, the bus ride out to view the anticipated 3:55 a.m. launch on Tuesday, February 11. And finally the Hubble 'pre-launch' party was also past. Nothing left now but a successful liftoff of the shuttle Discovery for an equally successful servicing mission. Nothing much to ask for at all! And that's just how it turned out to be.

The mood at KSC in the days before launch was upbeat. At the crowded MMT L minus 2 meeting, each of the speakers reviewed their area of expertise, problems, if any, and resolutions, and in a few cases problems still unresolved. Flight Projects Directorate's own John Campbell reviewed a NICMOS Guide problem with the group. Everyone was completely focused on the job at hand. Even the launch weatherman was confident that a front predicted to spread over KSC the afternoon before launch (it rained that day) would dissipate prior to launch. He was right. At launch time, there was hardly a cloud over the launch pad.

Washington and its politics was far away from everyone's thoughts. If you were thinking about another kind of weather (nine inches of snow from a few inch prediction), or the tumultuous year just past of furloughs, reduced budgets, blizzards and buyouts, you would find yourself 'thinking' to yourself. All was the business at hand at KSC; the business of successfully accomplishing the critical Second HST Servicing Mission. The Launch Poll at the MMT Meeting had just begun. Payload Processing? Go! External Tank? Go! Vehicle Engineering? Go! Launch and Landing? Go! Mission Operations? Go! Range? Go! Launch Weather? Go! And so it went around the long table. A few problems, but no doubts. A sense of quiet optimism pervaded the entire room.

All the preparatory work of HST's Flight Systems and Servicing Project was done. (See lead article by Ann Jenkins.) The baton of tireless work of civil servants and contractor personnel under the direction of Project Manager Frank Cepollina and Deputy George Morrow was being turned over to the seven astronauts to capture the HST Observatory and revitalize its equipment, and to the folks of HST Operations and Ground Systems, under Project Manager Ann Merwarth and Deputy Preston Burch. Their people in Code 441 operate the Space Telescope Operations Control Center (STOCC), observed by Senator Barbara Mikulski during the mission, as well as the HST Observatory. In charge of ground system facilities and all flight and ground hardware, they also oversee the Space Science Institute. Preston could be heard over NASA Select saying, "there is a sense of excitement and anticipation" amongst the people shortly before launch.

Back in Cocoa Beach, Goddard personnel fortunate enough to be there, and in many instances families and friends, were beginning to queue up at the informal bus terminal well before the 1:30 a.m. deadline. Indeed, anyone arriving as 'late' as 1:00 a.m. would find it impossible to find a parking spot in the lot of the tallest office building at Cocoa Beach. You would think they were giving away free food and drink, people arrived so early. No one wanted to risk missing out on the upcoming launch.

Virtually everyone aboard the long double line of filled buses and those still standing outside in the chill breeze was not only wide awake, but already anticipating the launch still nearly 3 hours away. No doubt this was a feeling indigenous to NASA employees, no matter where they were at the time. Many KSC personnel acknowledged later that day that they set their alarms for

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3:45 a.m., dressed and went outside their homes to view the launch.

At precisely 2:00 a.m., the buses started right on schedule. Appearing from the night sky like a huge snake slowly uncoiling from sleep, the buses wound into a long if not so straight line up highway A1A, heading for the viewing site of launch pad 39, located at the VIP Static Test Facility. Right on the dot, without one unexpected hold or surprise, Discovery lit up the dark, still early morning sky (3:55 a.m.) like a giant roman candle. Almost immediately thereafter came the booming roar of the liftoff, a crescendo of sound that immersed everyone in its totality and dispelled the biting chill of the pre-dawn air. "Oh my G-d" seemed to be the phrase most used by hundreds of spectators, from the very young to the very old who witnessed this singular event. Although some (pre) toddlers in their father's arms could not verbalize those words, their bright, wide open eyes spoke volumes ... future NASA employees for sure.

Frank Cepollina probably best summed up the thoughts of all those at the Cape and NASA well wishers everywhere when he said just before Discovery's landing:

"I feel wonderful. I've been walking on water for a week."

The third HST Servicing Mission is scheduled for December 1999, a somewhat shorter time than elapsed between the first and second servicing missions. The shuttle had not yet landed, but planning for that new mission was already underway. But for just a moment, Goddard's HST people and all those that support their efforts can take satisfaction in a job well done. And, for just another moment, those viewing the launch of Discovery can revel one more time in the spectacular glow that lit the entire sky in a burst of golden orange. A memory that most will never forget. On their way was the crew of STS-82 for what would be an incredibly successful rendezvous with, and upgrade & service of the Hubble Space Telescope. And as they say, the rest is history.

– The Editor

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The hard-working crew settled in for an extended sleep period, after which they began preparing for Hubble's release.

'Til We Meet Again

The Space Telescope Operations Control Center at Goddard crackled with excitement as teammates eagerly awaited Hubble's release. Aboard Discovery, astronomer Steve Hawley used the robot arm to gently lift Hubble from its work platform. With Hubble still on the robot arm, controllers at Goddard sent commands to open the telescope's aperture door. Hawley, who first deployed Hubble in April of 1990, again gently released it at 1:41 a.m. Eastern time over the southwest coast of Africa. On the ground, cheers and prayers went up for the team, the crew and the newly refurbished Hubble.

Hubble now resides in its highest orbit ever, at 335 by 321 nautical miles. It will be several more weeks before we see data from the new instruments, although initial tests indicate all is well.

"It was a great mission, accomplished only through the hard work and cooperation of the whole team-scientists, engineers, and support people. . . civil servants and contractors from Goddard, JSC, and KSC all working together," said Dr. John Campbell, Associate Director of Flight Projects for Hubble Space Telescope.

"Great people and great hardware make for spectacular missions!" declared Frank Cepollina, Project Manager of the HST Flight Systems and Servicing, the project responsible for upgrading Hubble.

Ann Merwarth, Project Manager for HST Operations and Ground Systems, added, "This mission leaves HST healthy and at the prime of its life-with the best science yet to come. GSFC, JSC and KSC teamwork made a very complex effort look easy. I'm extremely proud to be a member of the talented, dedicated NASA-HST team."

Perhaps Dr. Dave Leckrone, Senior Scientist for Hubble Space Telescope, summed it up best: "Three or 400 years from now none of us in all likelihood will be remembered as individuals. But certainly, the Hubble Space Telescope will be remembered 300 or 400 years from now as a high point in human civilization."

Ann Jenkins, Code 442/MDA, Principal Technical Writer

The Presence and Power of Diversity

The events of February 11, 1997 marked a first for me; an eyewitness view of a shuttle launch. I had never been to a launch of any kind, and the fact that I worked on the Hubble Space Telescope (HST) Program for 6 years heightened my anticipation of this, the Second Servicing Mission launch. I watched with excitement as bursts of orange and yellows lit the night sky, knowing that in some small way I had played a part in this. As the crowd of spectators cheered, I couldn't help but wonder about those individuals near and far, seen and unseen, known and unknown, who shared this same testimony. Who were they? My personal conclusion was that no one individual could possibly know them all. As the shuttle disappeared from view, I paused to reflect on the unique gifts, the aggregation of individual contributions and the diversity inherent to our individuality, which had come together to make the success of this mission possible.

– Sheri A. Thornton

With this in mind, while at the Cape I developed an informal survey to gain insight into perspectives of those attending one of NASA's most notable events. Survey input was open to anyone with a NASA badge, civil servant or contractor, attending the HST Second Servicing Mission launch. It should be noted that opinions cited represent a very small sampling of NASA personnel from various areas within the Agency. Following is the survey and some of the feedback provided:

Your involvement with the HST Servicing Mission and your presence at the Cape for launch provide a unique perspective. I am interested in gaining different insights on diversity in the workplace and its relevance to the HST Second Servicing Mission. Please share your views on the following questions.

Do you believe NASA to be an agency that promotes opportunities for all people? What evidence can you offer to support this?

Participants overwhelmingly believed that opportunities for everyone exist within the Agency. Respondents acknowledged the diversity evident among their co-workers, of various cultural backgrounds, who demonstrated high levels of expertise, over a wide range of professional disciplines. One individual remarked that, by having the opportunity to work at GSFC and visit various contractor facilities, it was amazing to witness the diversity of people required to make the program work.

What do you view is the benefit to NASA in cultivating workforce diversity for the purpose of meeting the Agency's goals?

One respondent indicated that the benefit of cultivating workforce diversity would be in facilitating a transition to changing demographics without a loss of efficiency. Another perspective cited diversity in views and opinions based upon one's cultural upbringing affords unique variations in solutions to problems.

Some of the responses identified global and universal implications. One respondent said that a main goal of NASA is cultivating a world view towards space. As such, the inputs and talents of everyone is required to make this goal a reality. A universal thought cited for consideration was, learning to live harmoniously and to tolerate and accept new and unique ideas within the corporate world, here on earth, will aid in living together in space and on other planets.

Some respondents admitted forthrightly that they weren't sure of the benefit for cultivating diversity.

In retrospect, can you recall any instances that stand out in your mind which depict how the success of the HST Second Servicing Mission was accomplished by the efforts of a diverse workforce?

Respondents again highlighted the fact that a diverse population of contractors and civil servants representing engineering, other technical and administrative disciplines worked together, to collectively achieve overall mission success.

The respondents stated that attending meetings, doing tours, or any job which required interfacing with others, caused one to realize

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Delta Successfully Launches Probes to Mars

On December 4, the Orbital Launch Services Project closed out 1996 with the successful launch of the Mars Pathfinder (MPF) spacecraft on Delta 240 from Cape Canaveral Air Station. The MPF launch came quickly on the heels of the Mars Global Surveyor (MGS) launch, which occurred on November 7 with Delta 239.

McDonnell Douglas, which provided the Delta launch vehicles, was instrumental in the advance fabrication, checkout and buildup of the vehicles, thus, making it possible to launch the Mars missions at the opening of tight planetary launch windows. From the onset of the Delta/Mars program 4 years ago, we knew that being launch-ready at the opening of these windows was crucial: MPF had a 30-day window while MGS had a mere 20 days. Missing the windows would require the programs to stand down for 2 years until Earth and Mars were once again in an optimal relative position. Aside from the significant financial hits of such delays, the future impact to the Mars '98 programs could have been enormous: Under the OLS Project's Med-Lite Program, we are again launching two Delta missions to Mars in 1998 from the same launch pads used by MGS and MPF. Also, the Mars 1998 missions plan to use MGS as an orbiting relay station and build upon lessons and data gathered by MPF.

High winds prevented Mars Global Surveyor from launching on November 6, the first day of the MGS window. The next day MGS launched without a hitch at 12:00:50 p.m. local time.

Like MGS, Mars Pathfinder scrubbed the first launch opportunity (December 2) due to poor weather. The second MPF attempt was halted at approximately 2:01 a.m., just 1 minute and 33 seconds before liftoff, because of a ground computer glitch. The Delta team, in exemplary fashion, worked through the remainder of the night to troubleshoot the problem and generate a workaround. This enabled us to make another launch attempt the very next day (predicted poor weather threatened to shut us down the remainder of the week had we delayed another day), resulting in the successful launch on December 4. Time of liftoff was 1:58:07 a.m. on a cloudless Florida night. This provided a stunning view of the Delta vehicle as it lit up the dark sky like a rapidly rising sun. Eyewitness reports from those outside during the launch were that you could see (with the naked eye) launch vehicle events all the way through the second stage ignition event, 4 minutes and 37 seconds after liftoff!

At this time, Mars Global Surveyor and Mars Pathfinder continue on their journey to Mars. MGS will enter a highly elliptical Mars orbit by September 1997 and through a series of aerobraking maneuvers, will drop down to a low-altitude, circular mapping orbit over the poles. In March 1998, MGS will begin data collection, compiling a systematic database as it surveys the Martian landscape and photographs unique features such as the polar caps and river channels. Following a 2 year mapping operation, MGS will serve as a data relay station for radio signals from subsequent landers and atmospheric probes. MGS is managed by the Jet Propulsion Laboratory in Pasadena and was built by Lockheed Martin in Denver.

Mars Pathfinder will take a more direct path to Mars culminating in a fiery plunge through the Martian atmosphere and a surface landing on July 4, 1997. The spacecraft's lander system includes a parachute, braking rockets, and an air bag system. Upon landing, a robotic microrover will be deployed. The mission will investigate the Martian atmosphere, surface meteorology, and surface geology. The "life expectancy" of MPF is substantially shorter than MGS, with a nominal mission lifetime of 1 month. Mars Pathfinder, as its name implies, was designed as a demonstrator for follow-on missions which will bring more complex spacecraft, using MPF design/technology heritage, to the "Red Planet" over the next decade. Mars Pathfinder is managed and was built by the Jet Propulsion Laboratory.

Delta launch activity under the OLS Project continues unabated in 1997 with planned August launches of ACE from Cape Canaveral, and ORSTED/SUNSAT (secondary payloads built by the countries of Denmark and South Africa, respectively) from Vandenburg Air Force Base, California.

David Mitchell, Code 470
MELVS Launch Services Manager

"Take a Bow"

Notes of Thanks for a Job Well Done...

"I would like to take this opportunity to personally thank you for your support during the 1996 Combined Federal Campaign. You and the other directorate coordinators worked as a team sharing your time and energy to make this campaign successful.

Your dedicated efforts will make a difference in the lives of many less fortunate individuals this coming year. Thanks again for all your hard work."

Lois C. Ryno, Combined Federal Campaign Administrative Officer, Code 201, to Sheila Stanford, Code 405 (December 2, 1996)

• "Thank you very much for your participation on the Red Team review of the Atmospheric Pollution, Aerosol and Chemistry Satellite (APACS) Step II Proposal in response to the Announcement of Opportunity for the Earth System Science Pathfinder (ESSP) Program. This proposal from the GSFC's Atmospheric Chemistry and Dynamics Branch represents an important next step in measuring levels of pollutants in the Earth's atmosphere and understanding their effects. Your effort spent reviewing our proposal will not only enhance the likelihood for its selection as a NASA mission, but also help establish credibility for the agency's Pathfinder in Earth science missions.

The APACS Team thanks you for your contribution and congratulates you on a job well done."

Richard J. Fitzgerald, APACS Mission Manager, Code 405, to Laura Milam, Code 424 and Dave Martin, Code 415 (December 3, 1996)

• "On behalf of the American Institute of Aeronautics and Astronautics (AIAA), National Capital Section (NCS) and the University of Maryland, I would like to thank you and Ray Taylor (Code 421) for organizing and hosting the 1996 Small Spacecraft Missions Symposium at the Goddard Space Flight Center (GSFC), October 1-29, 1996.

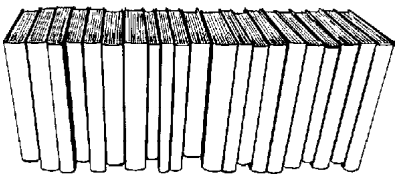
Based on the responses of the over 360 registered attendees, the Symposium was a tremendous success in bringing 19 cutting edge small spacecraft missions and technology leaders to Goddard for detailed technical presentations and interaction with the attendees. Approximately half of the attendees were from Goddard and half were from industry, academia, other government organizations and international entities.

The success of the Symposium is due largely to the energy and organizational skill of Ray Taylor in working with senior representatives from the aerospace communities of industry, academia, and government, and is a credit to GSFC and NASA.

All funds raised during the Symposium will be used to support the AIAA/NCS and GSFC jointly sponsored, student-led Get-Away-Special Experiment at DuVal High School in Greenbelt, MD."

Rebecca L. Griffin, Chair, National Capital Section/AIAA to Joseph Rothenberg, Director (November 8, 1996)

Quote of the Quarter



"Do not go where the path may lead, go instead where there is no path and leave a trail."

— Ralph Waldo Emerson

THINGS YOU SHOULD KNOW ABOUT

President's Quality Award Program

As you know, the Goddard Presidential Award Team did its work well, winning a site visit from an evaluation team. This was the first time that a NASA Center won a site visit on the first try. Eight other Federal organizations were visited from an original group of 88 competitors. Goddard's 'Celebration of Excellence' week was also a great success. Four event filled days preceded the evaluation team visit on January 13. Mike Donnelly (Section 1 lead person) and Howard Ottenstein represented Code 400 on the writing team, and Sheri Thornton and Howard worked on the celebration events. Final results are expected by late March or early April. Last year one winner was selected (there could be as many as two), and six 'prototype' (second place) awards presented.

We'll Miss You

Dee Faison has called it a day. No, she hasn't left HST or Goddard, but has decided that after 4 years of yeoman service as Editorial Assistant for The Critical Path, it was time to step aside and give someone else an opportunity to be 'Chief Grammatician' for the Code 400 magazine. Great job, Dee!!!

We welcome aboard Paula Wood (Code 408/ESSP), who is already hard at work on this very issue. We are happy Paula accepted this challenging position and are looking forward to having her here for the next 4 years, too.

Good Luck to all those Code 400 Employees who took the buyout and have left Goddard:

Vernon Weyers/400
Mary Adkins/400
Robert Flick/401
Jerre Hartman/404
Kenneth Sizemore/405
Raymond Topolski/407
George Daelemans, Jr./410
Mildred Saari/421
Richard Weber/421*
John Hurd/422
Donald Miller/470
John Knoll/480
John Underwood/480

* June 3, 1997

Thornton Continued from Page 8

that a wide variety of individuals contributed to the success of the mission.

Acts of recognition and award were cited as means by which to convey to the entire team, that contributions have been made by a diverse range of individuals and groups toward the success of the mission.

Working with NASA is an aspiration of many of our Nation's young people. What role do you believe NASA should play in developing those skills which are necessary for youth with this vision to achieve it?

The overriding theme reflected in survey responses was that our youth are our future and that NASA should be an inspiration and offer a ray of hope to the youth. Involvement in mentoring and in education were cited repeatedly as being important roles for the Agency to undertake. One example noted, as a means of getting the younger generation interested in science, was actively working with schools from elementary level through college, to provide opportunities for students to engage in scientific research.

One respondent indicated the importance of NASA to educate society about how the efforts of the Agency benefit all. By doing this, the Agency could show the human relevance of work and inspire individuals to pursue interests that would enable them to work with NASA.

Developing this article has given me an opportunity to consider a range of views while reflecting upon my personal philosophies. In short, it's given me something to think about. Perhaps it will do the same for you.

Ms. Thornton serves as the Flight Project Directorate's representative to the Center's Multicultural Advisory Committee. She worked as the HST, Operations and Ground Systems Project Financial Manager from November 1990 through 1996, and is currently the Resources Management Officer for the Mission To Planet Earth, Laser Altimetry Mission.

ATTENTION INTERNET BROWSERS:

The Critical Path is now on the Internet. You can find it at:

<http://fpd-b8-0001.gsfc.nasa.gov/critical/tcpweb/home.html>

or via the Code 400 Homepage.

FUTURE CODE 400 LAUNCHES FOR CY 1997

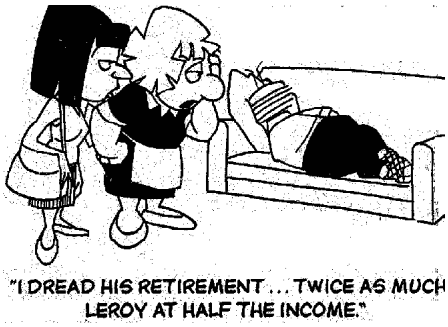
PROJECT	*LAUNCH DATE*
SWAS	MARCH 1997
GOES K	APRIL 1997
SNOE	MAY 1997
P91-1/ARGOES	AUGUST 1997
ORSTED (secondary mission)	AUGUST 1997
SUNSAT (secondary mission)	AUGUST 1997
ACE	AUGUST 1997
TRMM	AUGUST 1997
TERRIERS	AUGUST 1997
NOAA K	AUGUST 1997
EQUATOR-S	OCTOBER 1997
TRACE	DECEMBER 1997
SAC A	DECEMBER 1997

Key Appointments

Mark Fontaine, Deputy Project Manager / Resources, Landsat Project - Code 430

Herb Mittelman, Deputy Project Manager / Resources, TRMM Project - Code 490

Dorothy Pennington, Deputy Project Manager / Resources, POES Project - Code 480



Pending Center reorganizations, the following appointments have been made in Code 400:

Jim Moore, Director of Flight Projects (Acting) - Code 400

Charles Vanek, OLS Project Manager (Acting) - Code 470

Tony Comberiate, TDRS Project Manager (Acting) - Code 405

Dino Machi, International Projects Project Manager (Acting) -Code 404

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Howard K. Ottenstein,
Editor

Melanie D. Feinstein,
Production Assistant

Paula L. Wood,
Editorial Assistant

If you have a story idea, news item, or letter for The Critical Path, please let us know about it. Send your note to Howard Ottenstein via Email: hottenst@pop400.gsfc.nasa.gov, Mail: Code 403, or Phone: 6-8583. Don't forget to include your name and telephone number. Deadline for the next issue is April 28, 1997.